
APPENDIX A
GEOPHYSICAL SURVEY REPORT



Geophysical Survey

2300 Fulton Road, Cleveland, Ohio.



Prepared For

Weston Solutions, Inc.

711 East Monument Avenue, Ste. 201

Dayton, OH 45402

By

TERENCE M. HAMILL

October 30, 2013

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October 30, 2013

Laura Funk, CP
Weston Solutions, Inc.
711 East Monument Ave, Suite 201
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SUBJECT: Geophysical Survey-2300 Fulton Road, Cleveland, Ohio.

Mr. Holland,

GeoSearches, Inc has completed the Geophysical survey dated October 24, at the designated site at 2300 Fulton Road, Cleveland, Ohio.

This Full Report presents the results regarding the targeted survey, an Electromagnetic and Ground Penetrating Radar survey to detect if orphaned Underground Storage Tanks exist within the 2 client designated areas.

If you have further questions please contact GeoSearches, Inc and it has been a pleasure working with you on this project.

Best regard's,

A handwritten signature in dark ink, appearing to read "Terence M. Hamill". The signature is fluid and cursive, with a long horizontal stroke at the end.

Terence M. Hamill
President / Principal Geophysicist
GeoSearches, Inc.



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Section One

SITE & PROJECT DESCRIPTION



Introduction:

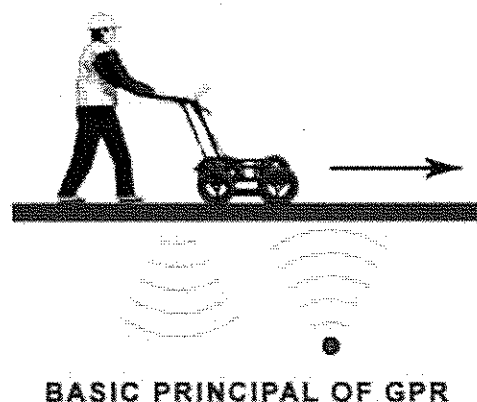
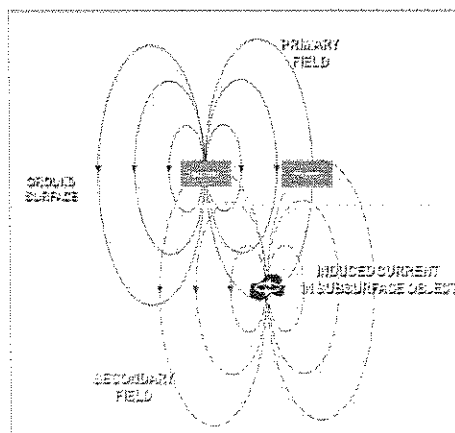
GeoSearches, Inc. was retained by Weston Solutions, Inc. to conduct a comprehensive EM and GPR Geophysical Survey at 2300 Fulton Road in Cleveland, Ohio.

The object of the survey was to determine the location of possible orphaned Underground Storage Tanks.

The non-intrusive, subsurface investigation was conducted using Electromagnetics and Ground Penetrating Radar.

The EM61-MK2 consists of two 1-meter (m) by 0.5m rectangular coils arranged such that the source/receiver coil is located 40 centimeters (cm) below a second receiver coil. An electromagnetic pulse induces subsurface eddy currents with associated secondary magnetic fields. The decay of the secondary magnetic fields induced in subsurface materials is measured by the receiver coil(s) and digitally recorded.

Ground Penetrating Radar (GPR) GPR detects subsurface structures by transmitting radio frequency waves into the ground and monitoring the strength and time delay of the reflection. The returning signal can then be evaluated to locate subsurface anomalies. Anomalies can be caused by void spaces, differences in soil/bedrock texture, differences in soil/bedrock moisture content, differences in the sediment compaction, and the presence of subsurface structures such as pipelines.



Part One: Method

Before fieldwork was started, historical data and detailed diagrams were reviewed to provide background information on the site.

An instrument verification strip (IVS) was conducted over a known area with surface targets. This was conducted over the area that is known that was well representative of the expected targets. The objective of the IVS is to verify that the geophysical detection system is operating properly. The IVS targets should be observed in the data with signals that are consistent with both historical measurements and physics-based model predictions. Adjacent measurements of the site noise determine whether targets of interest can be detected reliably to their depth of interest under the site conditions.

A preliminary, straight-line EM and GPR survey was conducted at the beginning of the investigation, establishing the typical response based on the site geology and subsurface structures. The survey was conducted by moving the EM and GPR equipment along the grid lines in two, perpendicular directions. The EM and GPR data were reviewed in the field before processing.

The survey was conducted using a Geonics EM61MK 2 and a Noggin GPR from Sensors and Software, Inc., with a 250MHz antenna. The data were acquired using the common-offset reflection profiling method. The depth of penetration ranged from 0 to 12 feet below the surface.

Part Two: Processing

This included the data processing procedures and interpretation of results based on the geophysical information collected during the geophysical survey. All data lines and anomalies were uploaded.

At the end of the field day the field geophysicist uploaded the data to the office computer, where the data was archived, backed-up, and processed and analyzed. The data processing sequence included verifying the validity of the data using the performance metrics, assessment of the track path and spatial sample density, latency correction, data leveling, and color-coded image generation utilizing software from the equipment manufacturers. Subsequent to the processing and review of the data, color-coded images of the geophysical sensor data were created for review.

The Ground Penetrating Radar data was processed by applying filters and gains to better define the anomalies of interest. Tools used to process the data and improve image quality included SPIVIEW TOOLS and WIN EKKO software from Sensors and Software, Inc.

Once each data survey is loaded and the grid properly oriented spatially, a short (3-sample) temporal median trim filter is applied to each GPR trace (one gridline) to attenuate noise spikes that degrades the data quality. A residual median filter is then applied to attenuate the wow (Short range GPR signals often possess a low-frequency component, commonly referred to as a "wow" that causes amplitude distortion along an individual trace), this filtering attenuates both the low and high frequency components of the wow, without adding precursors or other artifacts to the wavelet.

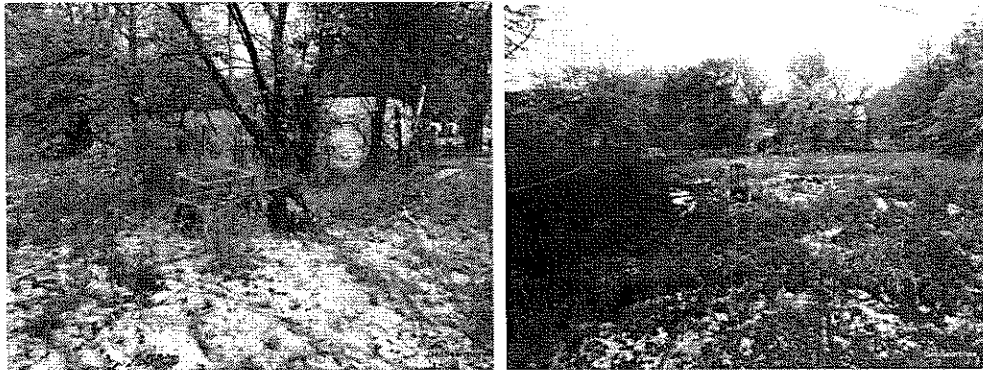
Time zero determination and datuming is also performed.

The data is then processed by applying amplitude compensation. For each GPR survey line, the rectified-amplitude versus time fall-off is determined. The inverse of this curve is scaled by a multiplier (0.3) to form the gain function. The multiplier is used to slightly reduce the gain function so that anomalously high amplitude values are not clipped after amplitude compensation.

Part Three: Interpretation and data quality

After completion of the data processing, each GPR and EM reflection image was evaluated to:

- (1) evaluate the GPR and EM penetration depth and resolution of the data collected at 250MHz and compare reflection character of the two, perpendicular line orientations; and
- (2) Interpret GPR and EM reflections and image patterns as bounding surfaces and architectural elements in profile.



Geophysical Equipment on site



Section Two

CONDITIONS and OBJECTIVE



Part One: Conditions

The GPR site conditions included:

- The survey area was 80% accessible and covered all areas of interest. The weather was cool and wet.
- Project area consisted of thick grass areas, trees, bushes concrete and a constant layer of debris.



Part Two: Objective

The primary objectives of the Geophysical survey were to provide subsurface data to determine the possible existence of Underground Storage Tanks



Section Three

RESULTS

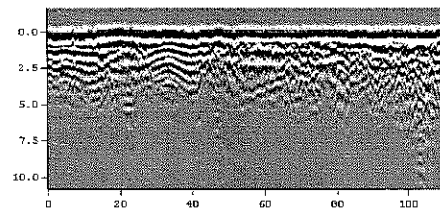


FIGURE 1

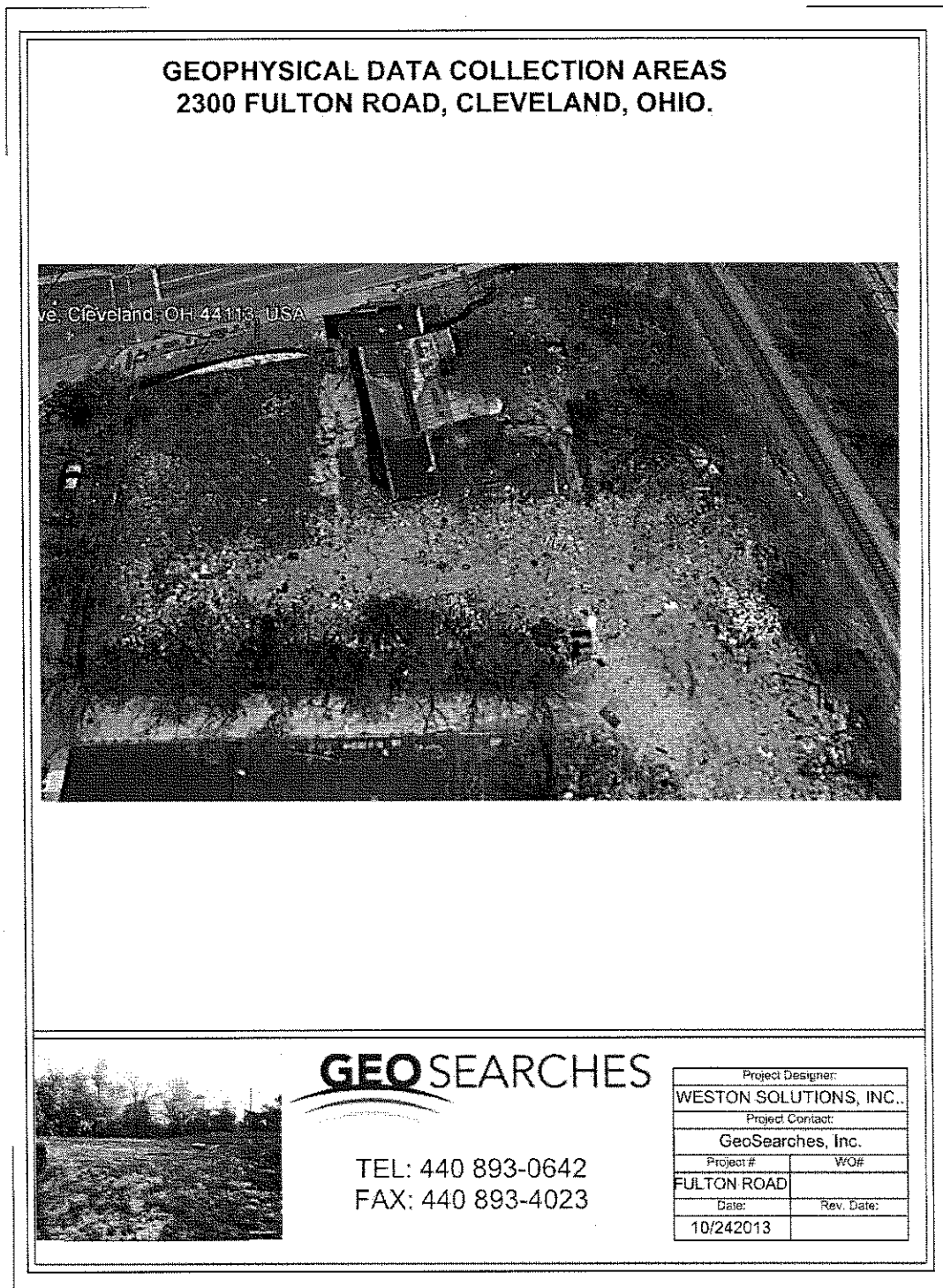


FIGURE 2

**GEOPHYSICAL DATA - PROCESSED PLAN VIEW
2300 FULTON ROAD, CLEVELAND, OHIO.**

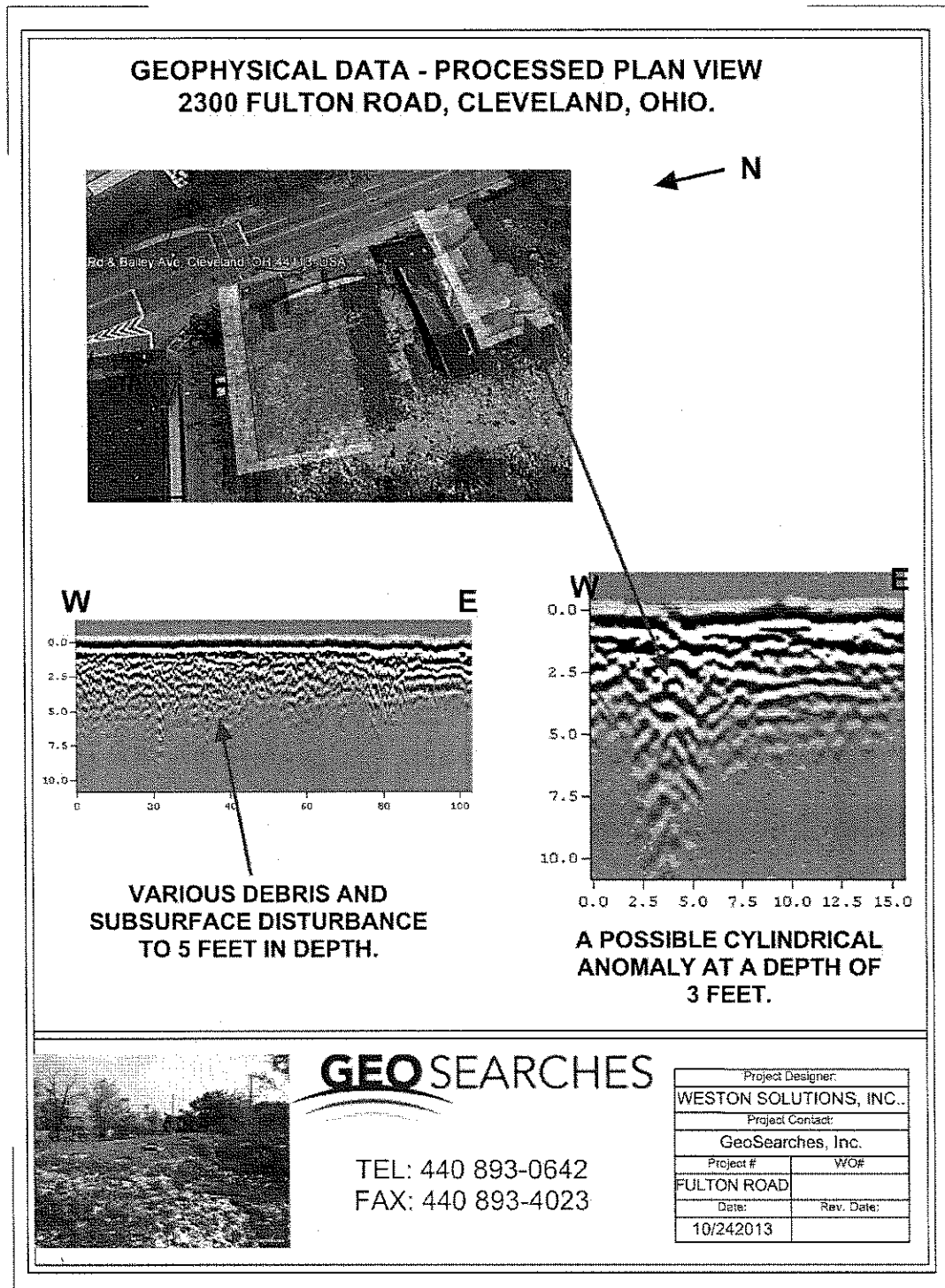


GEOSEARCHES

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Project Designer:	
WESTON SOLUTIONS, INC..	
Project Contact:	
GeoSearches, Inc.	
Project #	WO#
FULTON ROAD	
Date:	Rev. Date:
10/24/2013	

FIGURE 3



Results

As you can see in **Figure 2** the processed data presents the information as a time verses velocity model, which means how long each pulse of electromagnetics takes to penetrate the roadway and return to the surface.

The geophysical representation is by color standard which in this case yellow, green and blue being of slower velocity with consistency and the red color representing areas of higher velocity. An Underground Storage Tank will be represented by red in this case.

Please note that the purple color indicates the areas that could not be scanned due to tree, bushes, rubble and various debris that interfered with the geophysical equipment and the data collection.

The object of the Geophysical survey was to detect if any Underground Storage Tanks exist beneath the designated 2 areas at 2300 Fulton Road in Cleveland, Ohio.

During the survey it was physically possible to feel and see the undulation of the surface. Historical repairs have taken place before due to the subsurface water main break.

The study area was in 2 grid sections with each grid running west to east.

The larger data grid to the north had measurements of 110 feet in length with a width of 55 feet.

The smaller grid to the south measured 55 feet in length with a width of 20 feet.

The data was collected along lines with 5 feet intervals between the lines.

SECTION GRID 1

The data was collected in a west to east direction with Fulton Road the boundary to the east.

The data was collected within the designated area totaling approximately 7000 square feet, **Figure 2**.

The processed data had reflections of surface debris and subsurface disturbance to 5 feet in depth.

However the processed data did not show any reflections indicating that a UST can be found within this grids parameters.

The depth of penetration from the surface was 12 feet.

SECTION GRID 2

The data was collected in a west to east direction with Fulton Road the boundary to the east.

A pipe can be seen, within this area coming out of the ground.

The data was collected within the designated area totaling approximately 3000 square feet, **Figure 2**.

The processed data had reflections of surface debris and subsurface disturbance to 5 feet in depth.

However the processed data did show a cylindrical object beneath the surface at a depth of 3 feet around the area that the pipe can be seen. This will need further investigation.

The depth of penetration from the surface was 12 feet.

Conclusion

The Ground Penetrating Radar survey performed at the 2 designated areas within the site and produced good quality data

The processed data identified a cylindrical object below the surface at a depth of 3 feet.

A utility clearance survey was also conducted at the proposed boring locations.

General Qualifications

The data presented herein are interpreted. No warranty, certification, or statement of fact, either expressed or implied, regarding actual subsurface conditions within the surveyed area is contained herein. No interpretation of subsurface conditions can be made for areas not surveyed.